



U.S. Department of Energy

Energy Efficiency and Renewable Energy

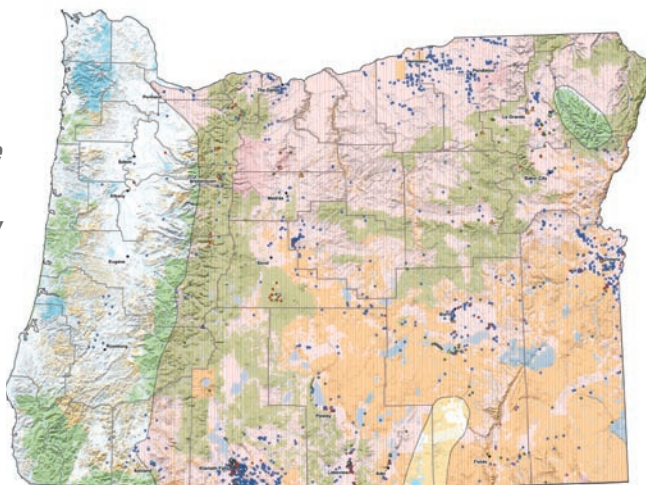
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable



Geothermal Technologies Program Oregon



Oregon's geothermal potential is third only to that of Nevada and California. Almost the entire state east of the Cascade range has ample low- to mid-temperature geothermal resources for direct-heat applications. This is especially true of the south and southeastern portions of the state. As a result, Oregon has about 2,200 thermal wells and springs that furnish churches, schools, homes, communities, businesses, and facilities with 500 to 600 billion Btus of energy per year.



Although Oregon currently generates no geothermal electricity, it has about a dozen areas that are known to be able to produce electricity, seven of which have been designated as prime areas for exploration. All told, the state's high-temperature geothermal areas have the potential for about 2,200 megawatts (MW) of electric power.

Current Development

Oregonians have been tapping into their low-to-moderate temperature geothermal resource for more than a century to heat buildings, grow plants in greenhouses, heat water for fish farming, melt snow from sidewalks and roads, and for other applications.

In Klamath Falls, for example, there are 550 geothermal wells that provide heat for as many as 1,000 homes. The city itself exploits the geothermal resource for a district heating system that provides heat for more than 25 churches, government and commercial buildings, and for melting snow from sidewalks.

One of the latest customers for the Klamath Falls district-heating system is a greenhouse complex run by IFA Nurseries, Inc. This complex has two 50,000 square-foot (ft²) greenhouses that can raise 4 million seedlings of ponderosa pine, hemlock, and other tree species.

There are four other geothermally heated greenhouses in Oregon that raise vegetables, potted plants, and tree seedlings. Plus, there are more than 50 other direct-use sites in the state with applications that range from heating a college campus to raising mushrooms.

Economic Benefits

By using geothermal energy instead of natural gas, Oregon customers typically save between 40% and 60% on their energy bills.

Specific examples of savings include:

- The Oregon Institute of Technology in Klamath Falls, which uses geothermal energy to heat almost 100% of its 600,000 ft² of buildings to save \$300,000 per year
- The Merle West Medical Center in Klamath Falls, which uses geothermal energy to heat 480,00 ft² of buildings and to melt snow off sidewalks to save \$180,000 annually

In Klamath Falls, Oregon, a geothermal district heating system keeps the sidewalks clear and dry at the Basin Transit Station after a snowfall.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



Manager and field tech show an example of plug seedlings being grown at IFA Nurseries' recently constructed Klamath Falls greenhouse, which is geothermally heated.

- Gone Fishing aquaculture, whose use of geothermal energy avoids 24 million kilowatt-hours of electricity annually, for a savings of \$1,350,000
- The Warner Creek Correctional Center, a 400-bed facility being built in Lakeview, which will use geothermal energy to heat the facility and avoid the use of 180,000 gallons of propane per year, for an annual savings of more than \$100,000.

The economic potential of geothermal energy, however, is far larger than indicated by the current exploitation of low- to mid-temperature geothermal resources. For example, by fully developing its 2,200 MW of electric potential from high-temperature geothermal areas, Oregon could generate approximately 183 billion kilowatt-hours of electricity per year. This is enough electricity to supply about 2 million homes with their electrical needs or nearly 40% of the state's current electricity consumption.

Technical Capabilities

The Northwest is fortunate to be the home of the Geo-Heat Center, which is part of the Oregon Energy Center housed at the Oregon Institute of Technology campus in Klamath Falls. Since 1975, the Geo-Heat Center has provided information research and technical assistance to developers of geothermal energy.

History

In the late 1800s, recreational spas were developed in the eastern United States and in several western states. In Oregon, the first large-scale use of geothermal springs came with the construction in 1864 of the Hot Springs Sanatorium, near La Grande.

In Klamath Falls, the use of geothermal energy for heating began around 1900 when several homes were heated using the artesian flow from local hot springs. After 1911, the Butler Natatorium opened. And in 1929 the first down-hole heat exchanger was installed. (This is a heat exchanger that eliminates the need to pump water from wells to heat homes and other applications, thus conserving the resource.)

Development expanded greatly in the 1920s and 1930s when the Klamath Union High School was built to use geothermal energy for heating. Development continued in the 1940s when the first highway de-icing system was installed on Esplanade Street in Klamath Falls. In 1964 the new Oregon Institute of Technology campus was built to depend exclusively on geothermal water for heating.

The city of Klamath Falls initiated the building of its district heating system in 1981. Originally intended to serve 14 government buildings, the system has since increased its customer base substantially. (See also the information on Klamath Falls on the first page of this fact sheet.)

In addition to Klamath Falls, more than 30 other communities have been developing systems to use geothermal heat, including Lakeview, La Grande, Vale, and other eastern Oregon cities. Recently, a handwritten district-heating feasibility study for Lakeview, dated 1911, was discovered. The proposed project was to be patterned after the successful Boise, Idaho, project—then nearly 20 years old.



GEOPOWERING THE WEST

GeoPowering the West is a cooperative federal, state, and local effort to promote awareness of the vast geothermal energy resources in the western United States, including Alaska and Hawaii. GeoPowering the West partners with businesses, government officials, Native American groups, utilities, and energy consumers to expand the use of geothermal energy.

For more information contact:

EERE Information Center

1-877-EERE-INF (1-877-337-3463)

eereic@ee.doe.gov or visit: www.eere.energy.gov

Geo-Heat Center

John Lund, Director

Oregon Institute of Technology

(541) 885-1750 or visit: geoheat.oit.edu

Oregon Department of Energy

Carel deWinkel, Carel.Dewinkel@state.or.us

(503) 378-6099 or visit:

www.energy.state.or.us

U.S. Department of Energy Western Regional Office

Curtis Framel, Curtis.Framel@EE.DOE.GOV

(206) 553-7841 or visit:

www.eere.energy.gov/regions/western

U.S. Department of Energy GeoPowering the West

Susan Norwood, National Coordinator

susan.norwood@hq.doe.gov

(202) 586-4779 or visit:

www.eere.energy.gov/geopoweringthewest

Produced for the

U.S. Department of Energy (DOE)

Energy Efficiency and Renewable Energy



U.S. Department of Energy

Energy Efficiency and Renewable Energy

1000 Independence Avenue, SW
Washington, DC 20585

By the National Renewable Energy Laboratory,
a DOE National Laboratory

DOE/GO-102004-2036

February 2005

Printed with a renewable source ink on paper containing at least 50% wastepaper, including 20% postconsumer waste.